

Applied A.I. Solutions

Data Visualization Techniques

Professor
Daniel Vitaver, EMBA

daniel.vitaver@georgebrown.ca

DATA VISUALIZATION TECHNIQUES

Business Intelligence tools

Tableau Desktop Pro

DATA VISUALIZATION TOOLS: TABLEAU

1

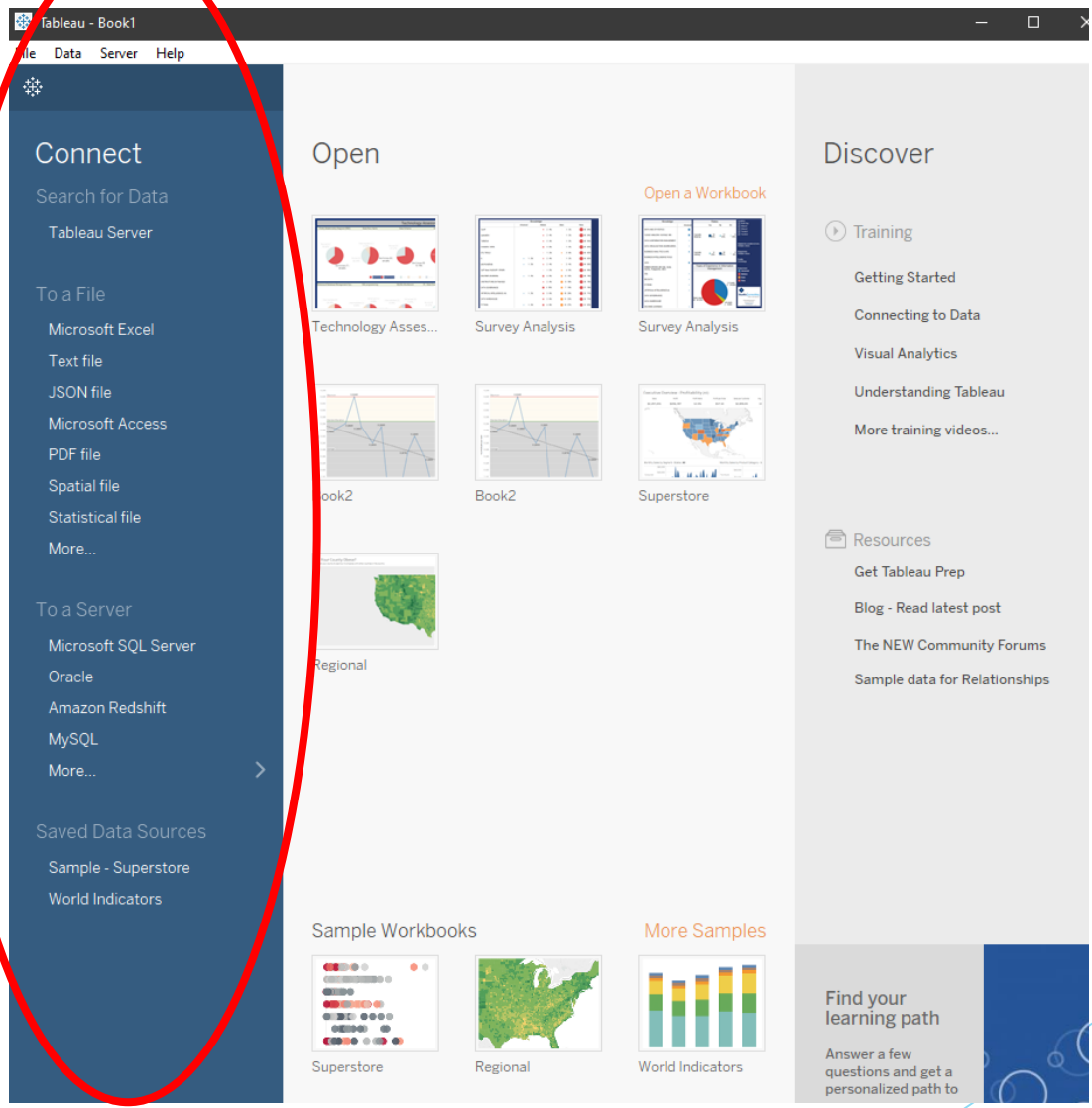


TABLEAU: Worksheet and Canvas

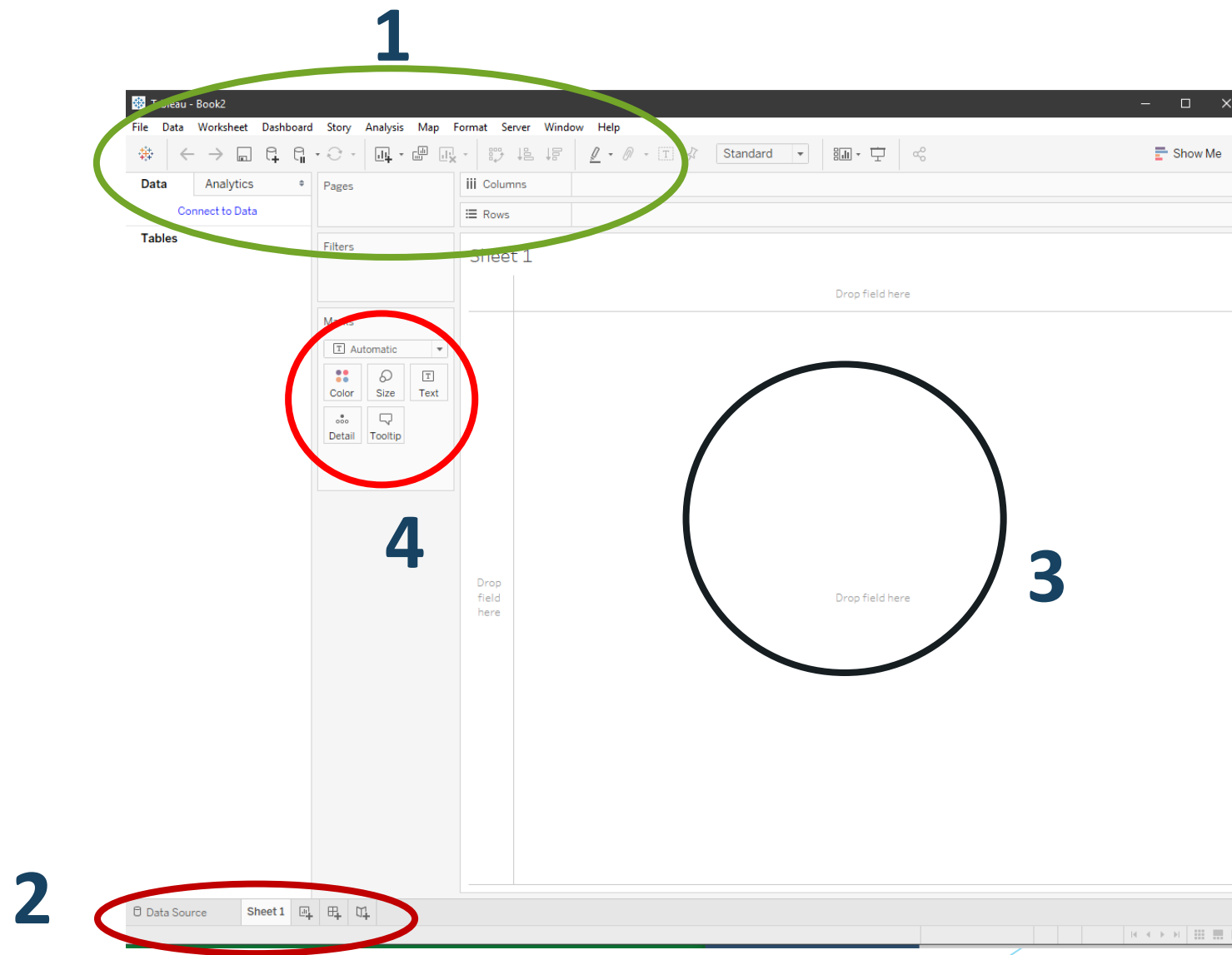
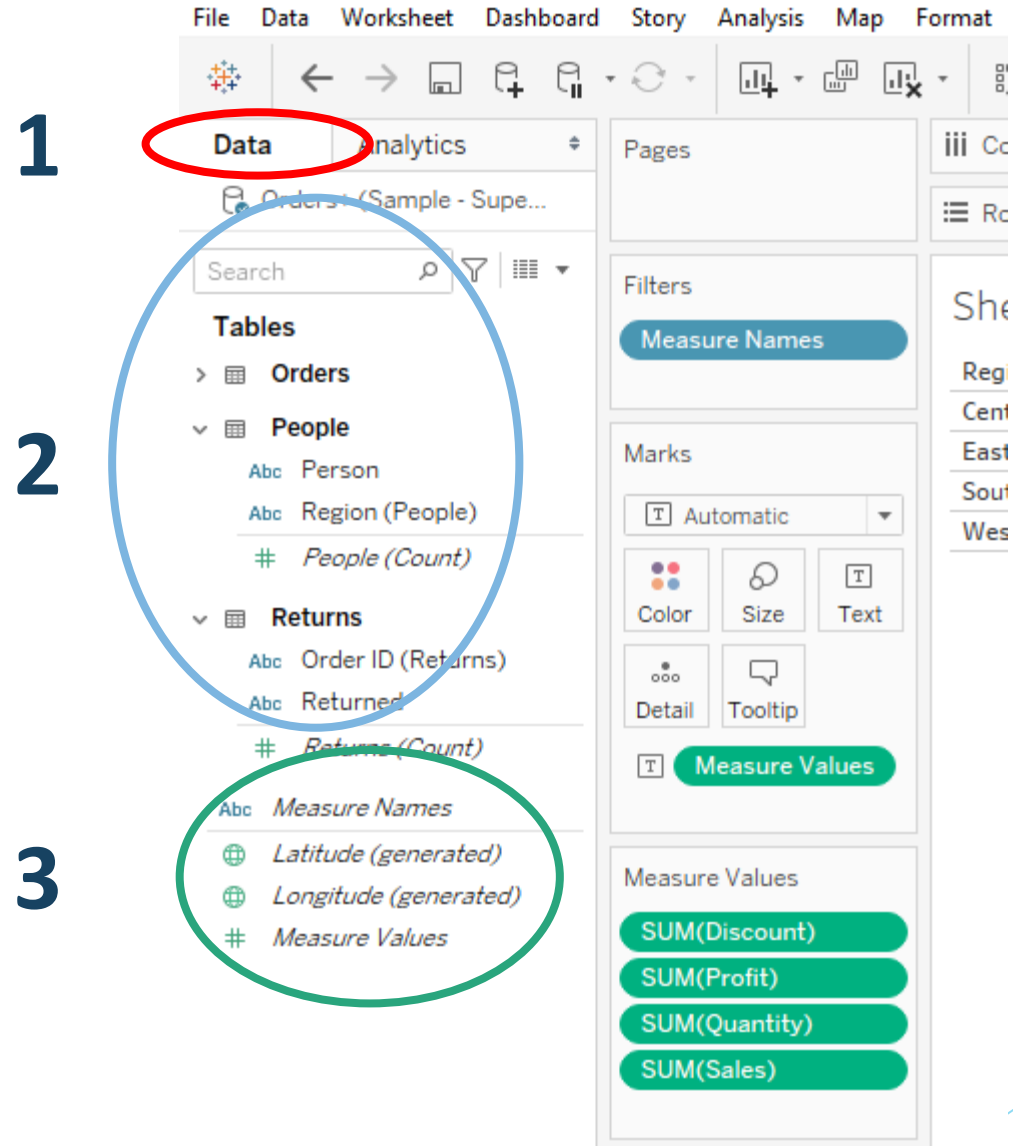


TABLEAU – Dimensions and Measures

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3



The screenshot shows the Tableau interface with the following elements:

- 1**: The **Data** tab in the top navigation bar is circled in red.
- 2**: The **Tables** pane on the left is circled in blue. It contains:
 - Orders**
 - People** (expanded):
 - Person
 - Region (People)
 - People (Count)
 - Returns** (expanded):
 - Order ID (Returns)
 - Returned
 - Returns (Count)
- 3**: The **Measure Names** section at the bottom of the left pane is circled in green. It contains:
 - Measure Names
 - Latitude (generated)
 - Longitude (generated)
 - Measure Values

On the right side of the interface:

- Filters**: Contains a button for **Measure Names**.
- Marks**: Contains a dropdown set to **Automatic**, and buttons for **Color**, **Size**, **Text**, **Detail**, and **Tooltip**.
- Measure Values**: Contains buttons for **Measure Values**, **SUM(Discount)**, **SUM(Profit)**, **SUM(Quantity)**, and **SUM(Sales)**.

Data Types

Data type icons in Tableau

Icon	Data type
Abc	Text (string) values
📅	Date values
🕒	Date & Time values
#	Numerical values
T F	Boolean values (relational only)
🌐	Geographic values (used with maps)
📊	Cluster Group (used with Find Clusters in Data 📄)

You can change the data type for a field either on the **Data Source** page or in the **Data** pane.

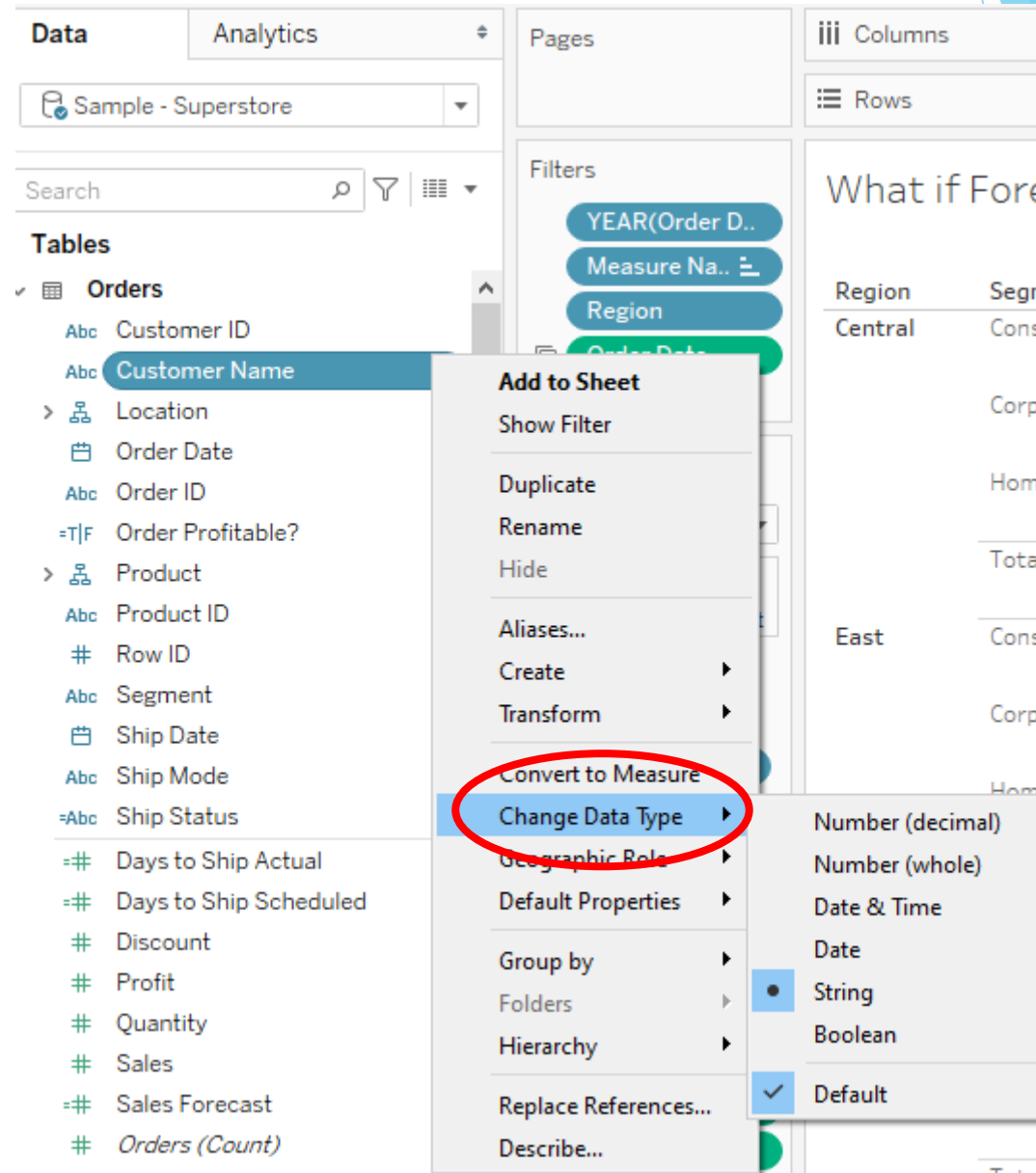


TABLEAU – Filters, Formats

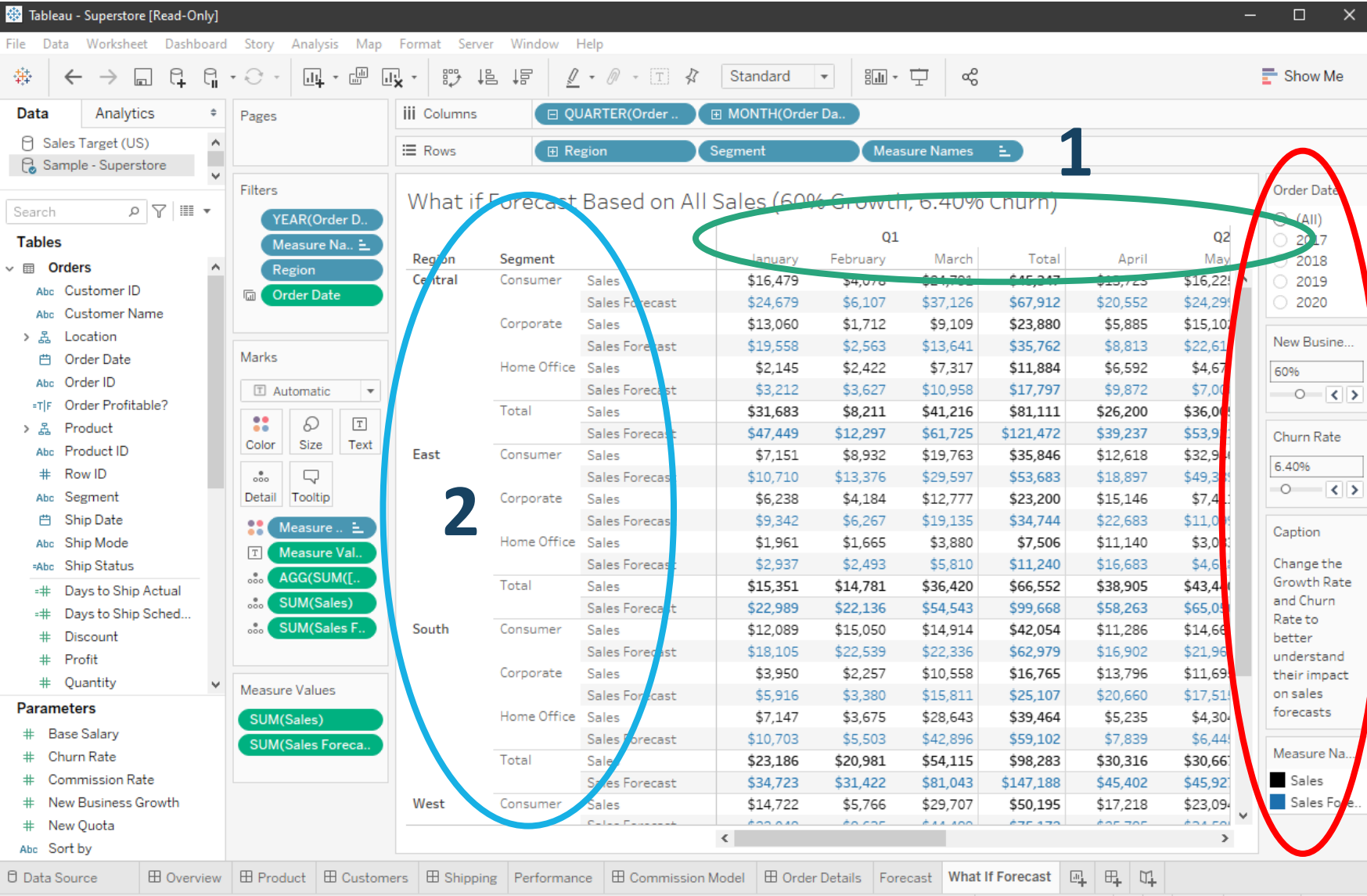


TABLEAU – Filters, Formats

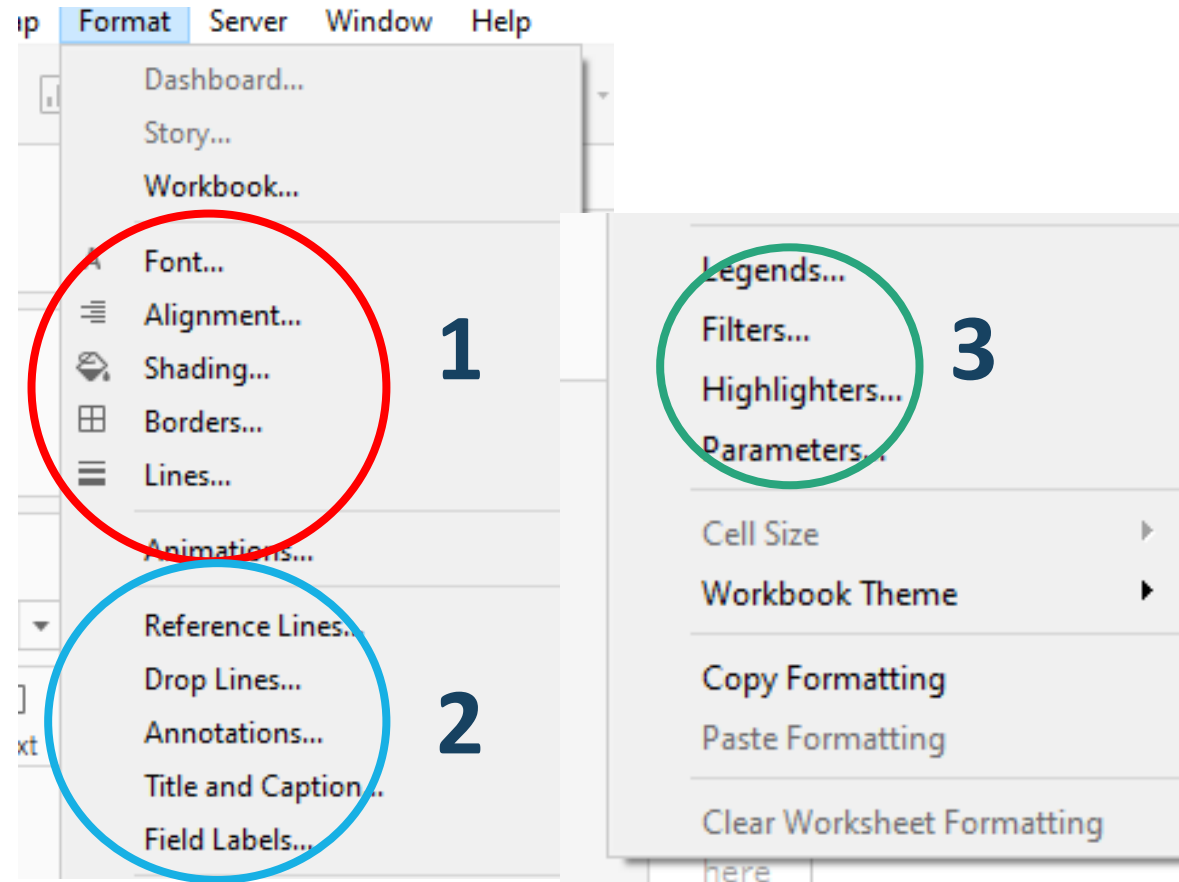


TABLEAU – Filters, Formats

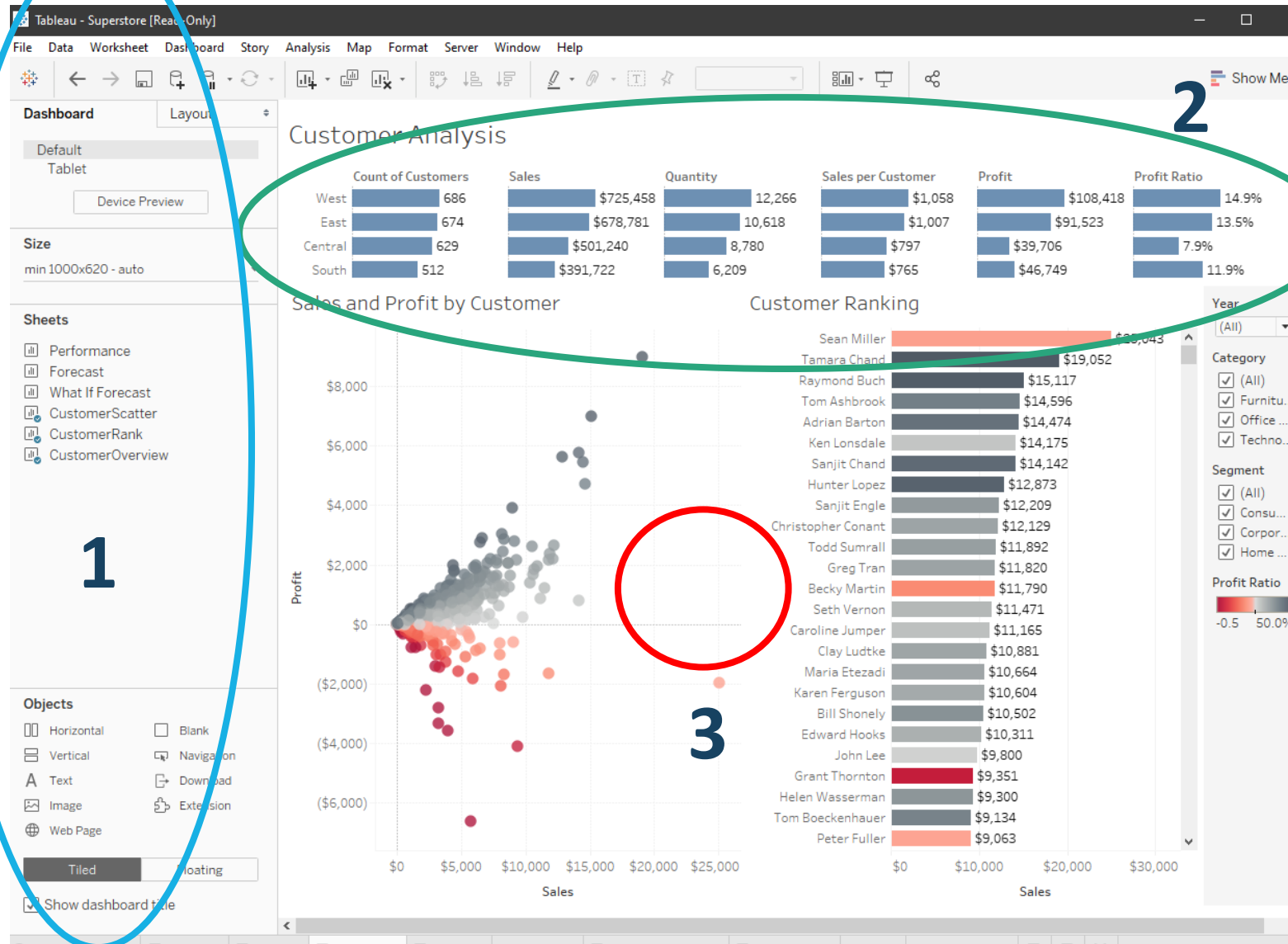


TABLEAU – Filters, Formats

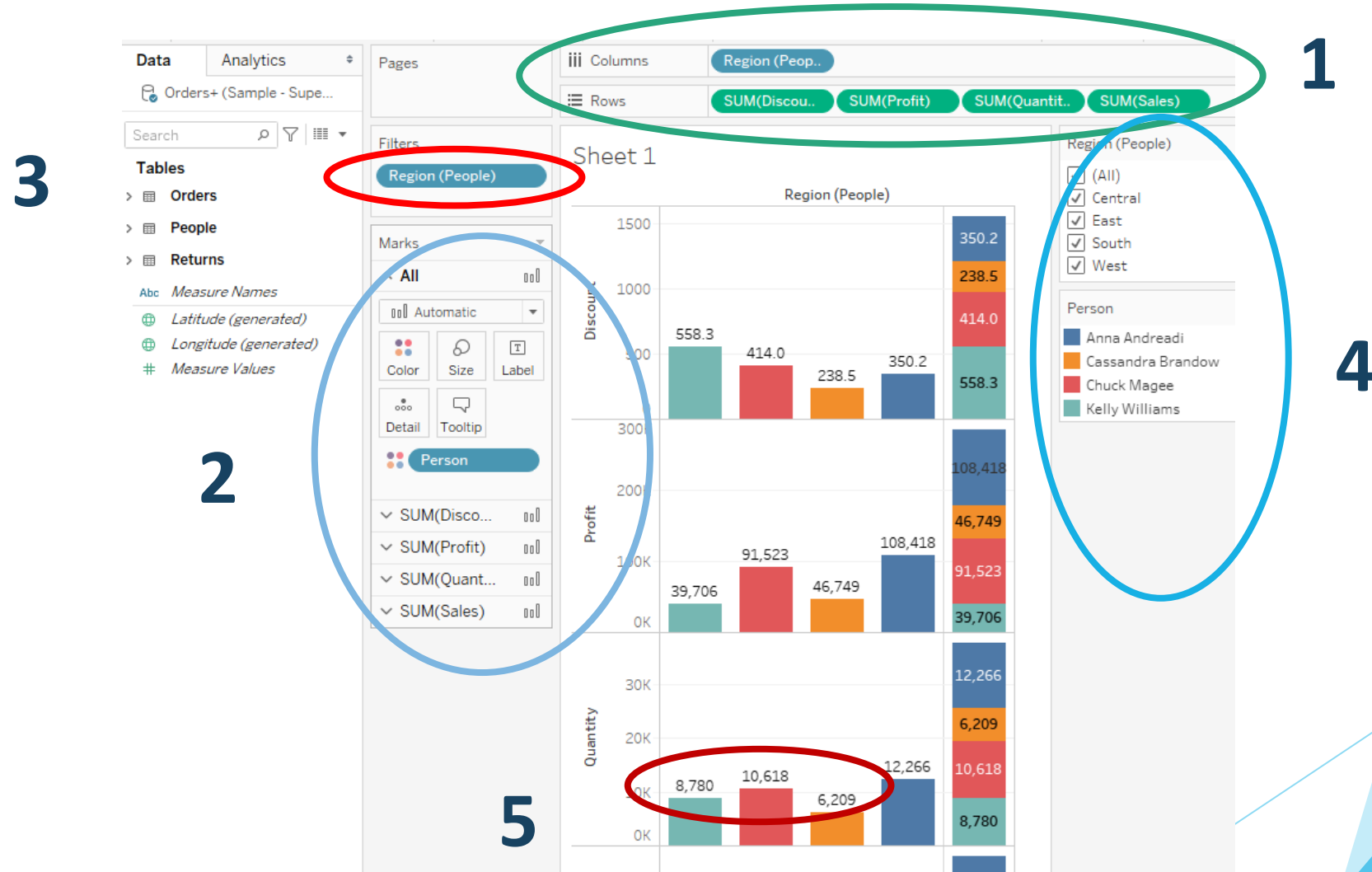
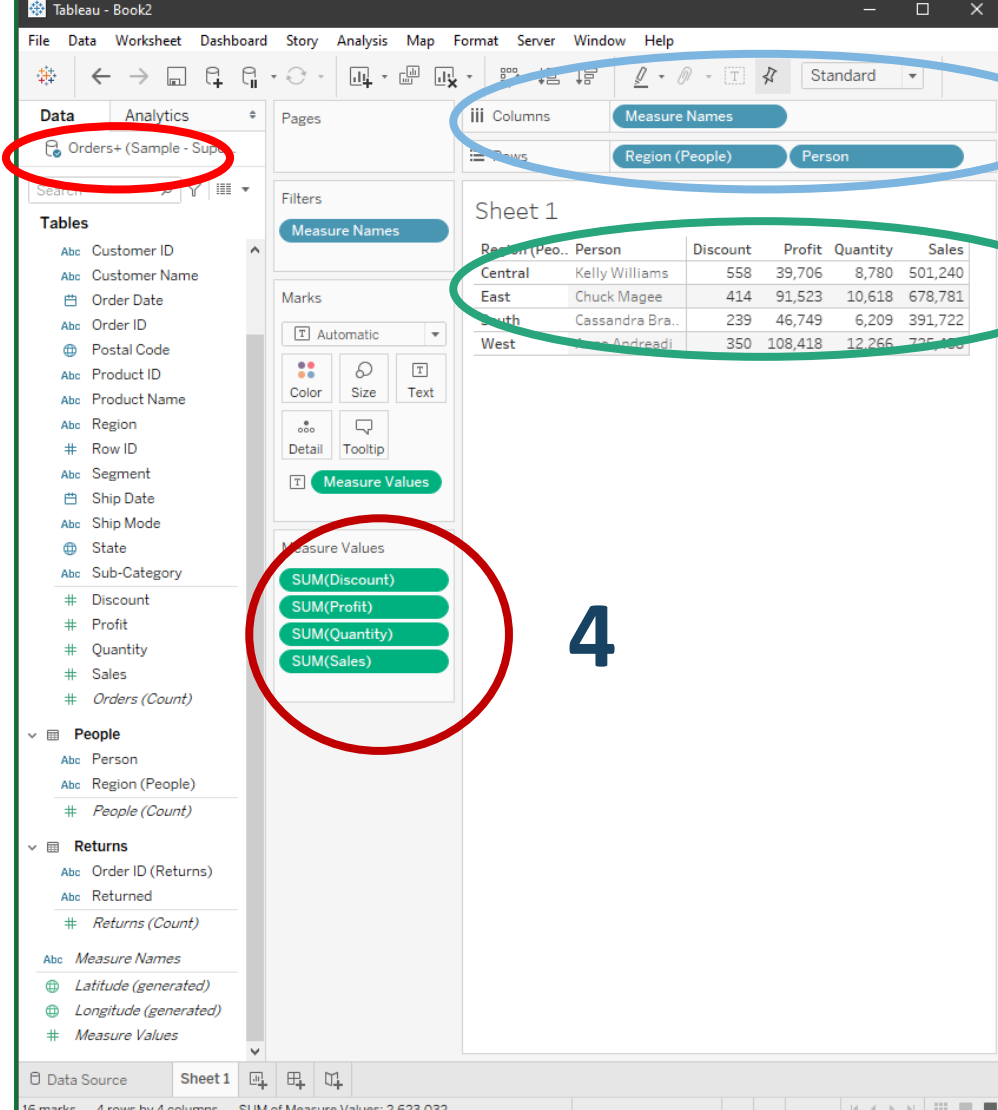


TABLEAU – Text Table

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The screenshot shows the Tableau interface with the following components highlighted:

- 1**: The 'Orders+ (Sample - Supermarket)' data source selected in the Data pane.
- 2**: The Columns shelf containing 'Measure Names' and 'Region (People)'. The Rows shelf contains 'Person'.
- 3**: The Marks card set to 'Automatic' and the Marks shelf containing 'Measure Values'.
- 4**: The Measure Values shelf containing 'SUM(Discount)', 'SUM(Profit)', 'SUM(Quantity)', and 'SUM(Sales)'.

The resulting text table in Sheet 1 is as follows:

Region (People)	Person	Discount	Profit	Quantity	Sales
Central	Kelly Williams	558	39,706	8,780	501,240
East	Chuck Magee	414	91,523	10,618	678,781
South	Cassandra Bra...	239	46,749	6,209	391,722
West	James Andreadi	350	108,418	12,266	726,188

TABLEAU – Data Visualization Best Practices

1

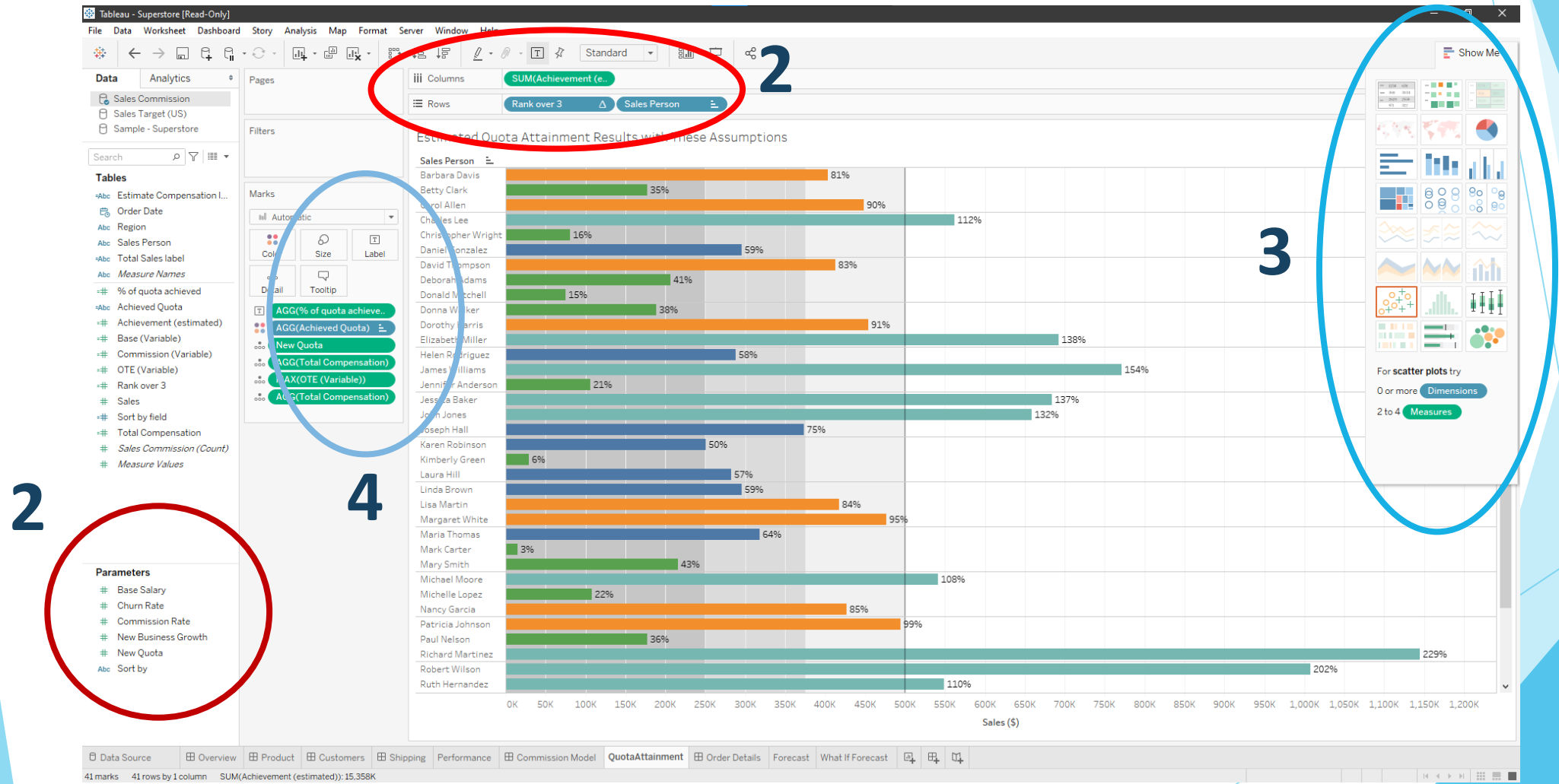


TABLEAU – Data Visualization Best Practices

	Dimensions	Measures	Date	Geo
Text Table	1+	1+		
Stacked Bars	1+	1+		
Circle Views	1+	1+		
Side-by-Side Bars	1+	1+ (3+ fields)		
Side-by-Side Circles	1+	1+ (3+ fields)		
Highlight Tables	1+	1		
Heat Maps	1+	1 or 2		
Pie Charts	1+	1 or 2		
Tree Maps	1+	1 or 2		
Horizontal Bars	0+	1+		
Maps	0+	0 to 1		1
Symbol Maps	0+	0 to 2		1



TABLEAU – Data Visualization Best Practices

	Dimensions	Measures	Date	Geo
Lines, continuous	0+	1+	1	
Lines, discrete	0+	1+	1	
Area Charts, continuous	0+	1+	1	
Area Charts, discrete	0+	1+	1	
Dual Lines	0+	2	1	
Dual Combination Charts	0+	2	1	
Gantt View	1+	0 to 2	1	
Histogram		1		
Box-and-Whisker Plot	0+	1+		
Bullet Graphs	0+	2		
Scatter Plots	0+	2 to 4		
Packed Bubbles View	1+	0 to 2		



DATA VISUALIZATION TECHNIQUES

Data Blending

Data Combination (relationships, joins, blends)

- Data blending is a method for combining data from multiple sources.
- Data blending brings in additional information from a secondary data source and displays it with data from the primary data source directly in the view.
- There are several ways to combine data, each with their own strengths and weaknesses.

https://help.tableau.com/current/pro/desktop/en-us/multiple_connections.htm

Data Combination (relationships, joins, blends) – cont'd

- **Relationships** are the default method and can be used in most instances, including across tables with different levels of detail
 - Flexible and adaptable to the structure of the analysis on a sheet-by-sheet basis
 - Cannot be formed between tables from data sources published to Tableau Server or Tableau Online
 - Cannot be formed based on calculated fields

https://help.tableau.com/current/pro/desktop/en-us/multiple_connections.htm

Data Combination (relationships, joins, blends)– cont'd

- **Joins** combine tables by adding more columns of data across similar row structures
 - Can cause data loss or duplication if tables are at different levels of detail, and joined data sources must be fixed before analysis can begin

https://help.tableau.com/current/pro/desktop/en-us/multiple_connections.htm

Data Combination (relationships, joins, blends)– cont'd

- **Blends** never truly combine the data. Instead, **blends** query each data source independently, the results are aggregated to the appropriate level, then the results are presented visually together in the view.
 - Blends can handle different levels of detail and working with published data sources.
 - Blends are established individually on every sheet and can never be published, there are simply blended results from data multiple data sources in a visualization

https://help.tableau.com/current/pro/desktop/en-us/multiple_connections.htm

Data Combination (relationships, joins, blends) – cont'd

- Blends handle data sources at different levels of details and can be combined with relationships.
- Relationships have fewer technical limitations than data blending and are the **recommended way of combining data when possible**.

https://help.tableau.com/current/pro/desktop/en-us/multiple_connections.htm

Data Blending –

cont'd



1

Tableau - Book1

File Data Server Window Help

Connections Add

localhost MySQL

Database

gbc_superstore

Tables

- category
- city
- country
- customer
- customer_address
- order
- postal
- product
- product_order
- region
- state
- sub_category
- New Custom SQL
- New Union

product+ (GBC_Superstore)

customer_address

postal

Sort fields Data source order

Field Name	Table	Remote Field Name
# Id (State)	state	id (state)
🌐 Name (State)	state	name (state)
# Region Id	state	region_id

4

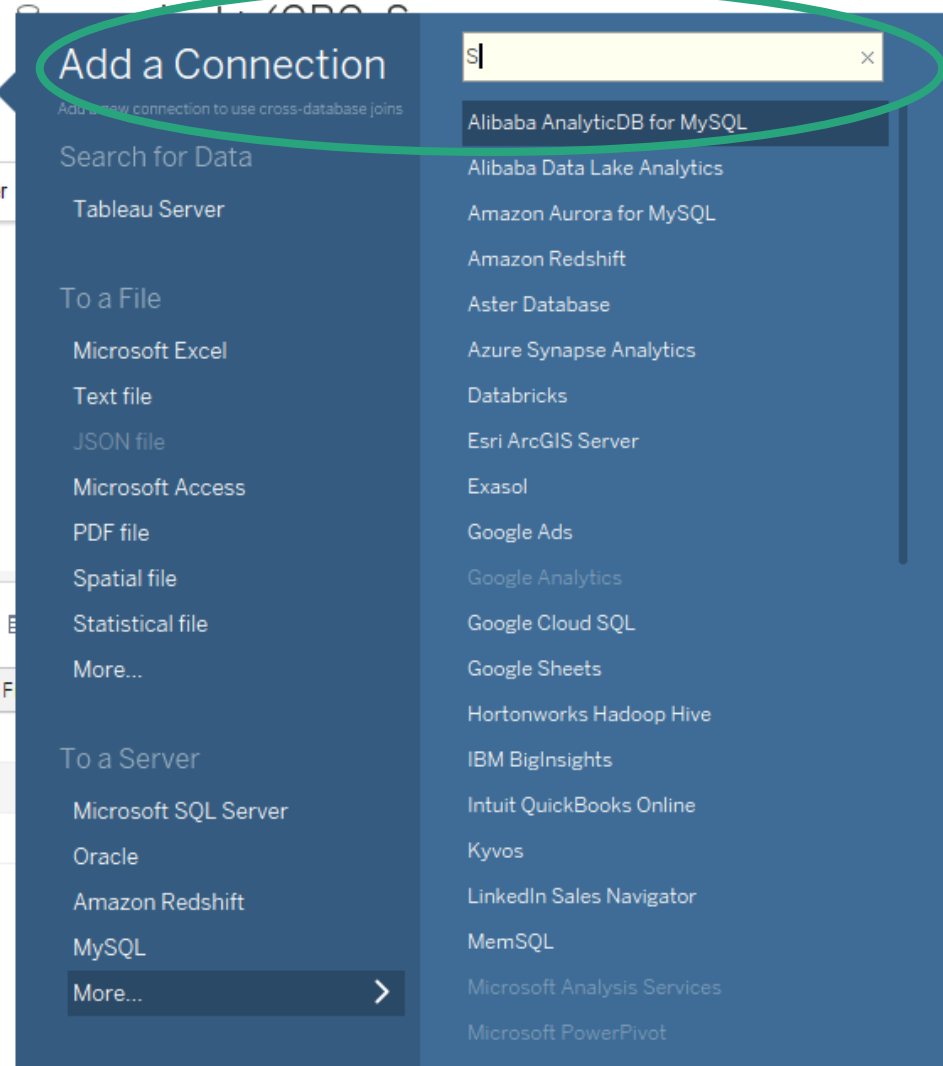
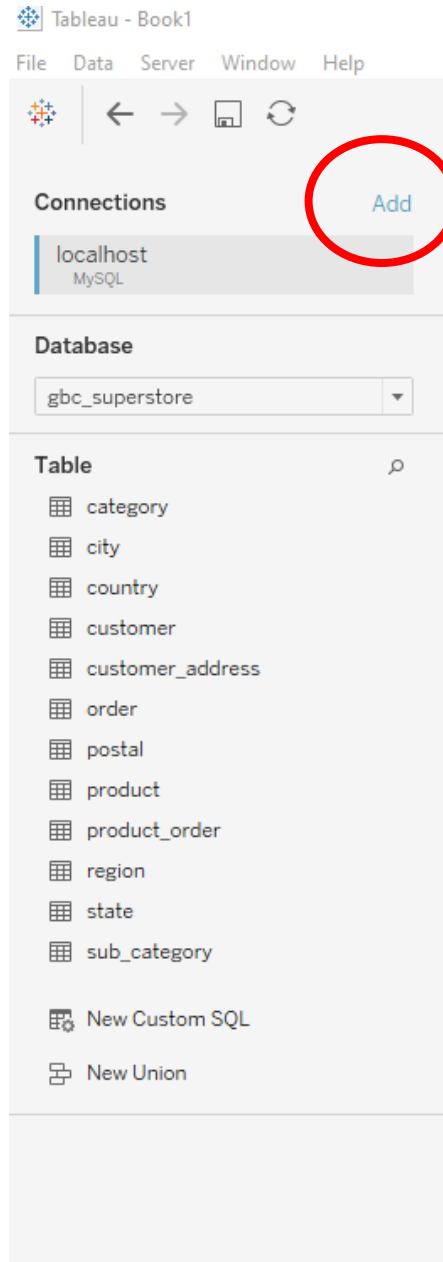
2

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Data Blending – cont'd

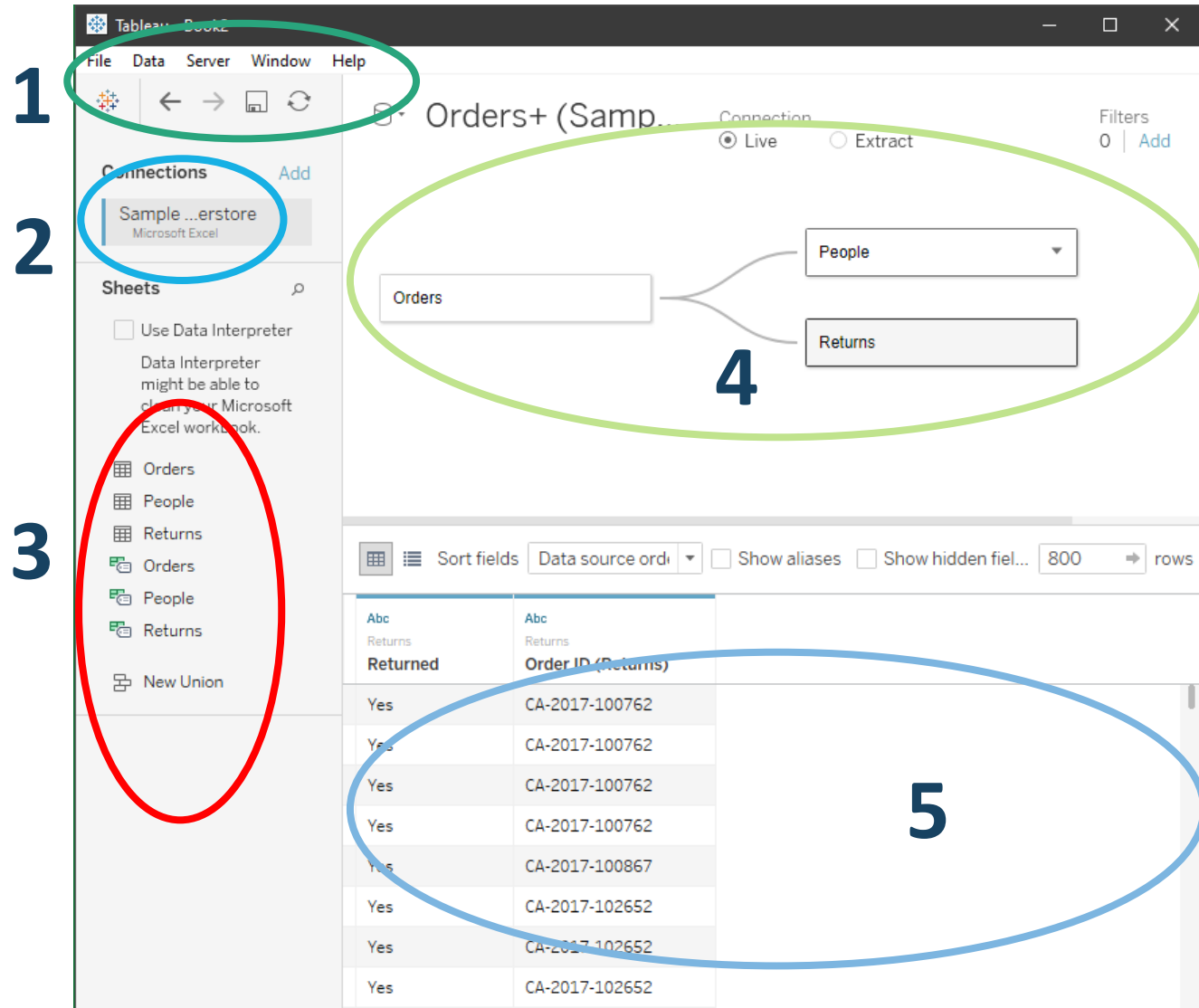
1



2



Tables and Joins – cont'd



1 Menu bar (File, Data, Server, Window, Help)

2 Connections pane (Sample ...erstore, Microsoft Excel)

3 Sheets pane (Orders, People, Returns, Orders, People, Returns, New Union)

4 Join diagram (Orders joined to People and Returns)

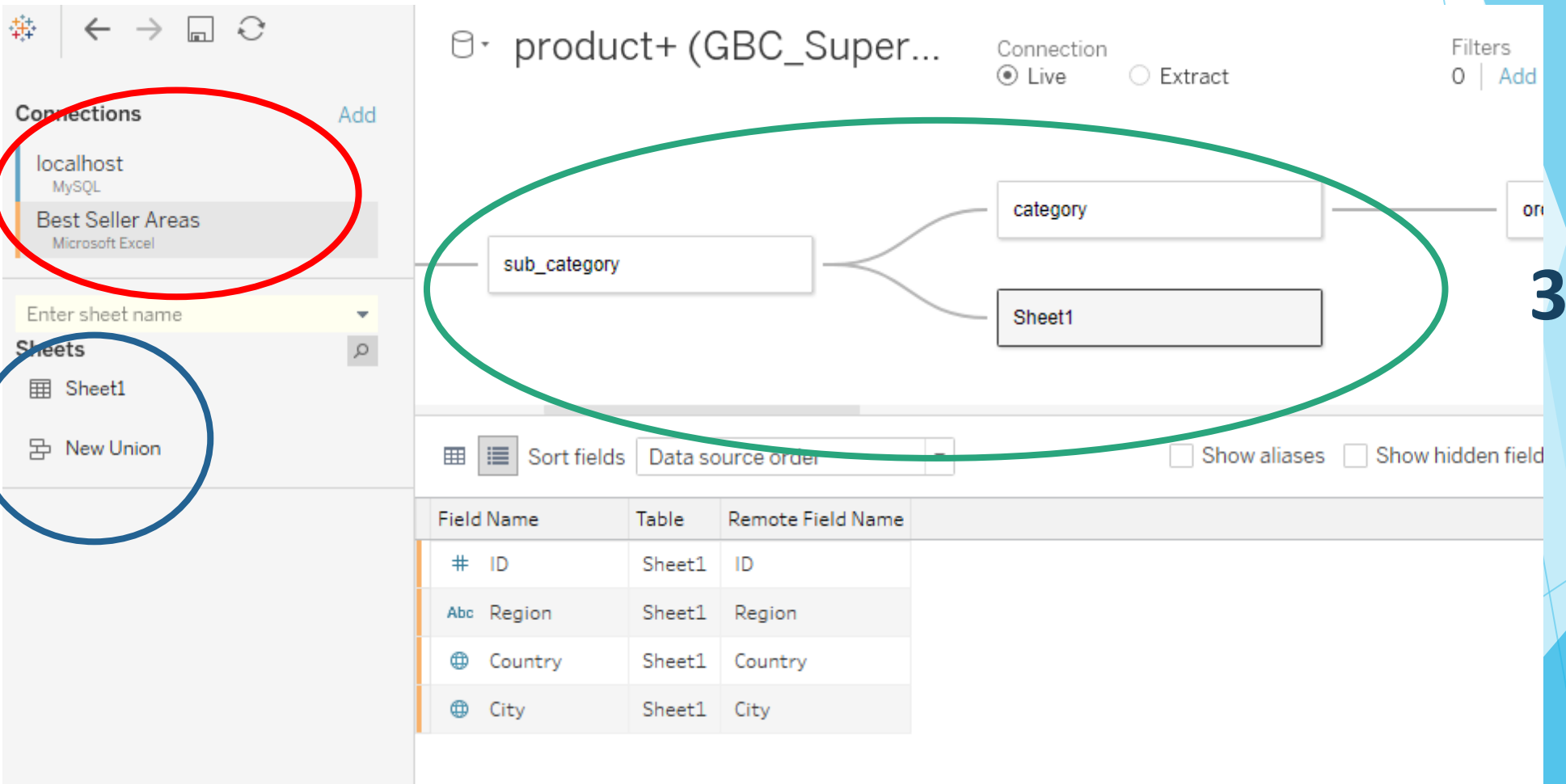
5 Data preview table

Returned	Order ID (Returns)
Yes	CA-2017-100762
Yes	CA-2017-100762
Yes	CA-2017-100762
Yes	CA-2017-100762
Yes	CA-2017-100867
Yes	CA-2017-102652
Yes	CA-2017-102652
Yes	CA-2017-102652

Tables and Joins – cont'd

1

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The screenshot shows the Tableau Desktop interface. On the left, the 'Connections' pane is open, showing 'localhost MySQL' and 'Best Seller Areas Microsoft Excel'. The 'Best Seller Areas' connection is selected. Below it, the 'Sheets' pane shows 'Sheet1' and 'New Union'. A red circle highlights the 'Connections' pane, and a blue circle highlights the 'Sheets' pane. In the center, a join diagram is shown with 'sub_category' connected to 'category' and 'Sheet1'. A green circle highlights this join diagram. On the right, the 'Filters' pane shows '0 | Add'. Below the join diagram, the 'Sort fields' dropdown is set to 'Data source order'. At the bottom, a table lists the fields from the data source.

Field Name	Table	Remote Field Name
# ID	Sheet1	ID
Abc Region	Sheet1	Region
🌐 Country	Sheet1	Country
🌐 City	Sheet1	City

3

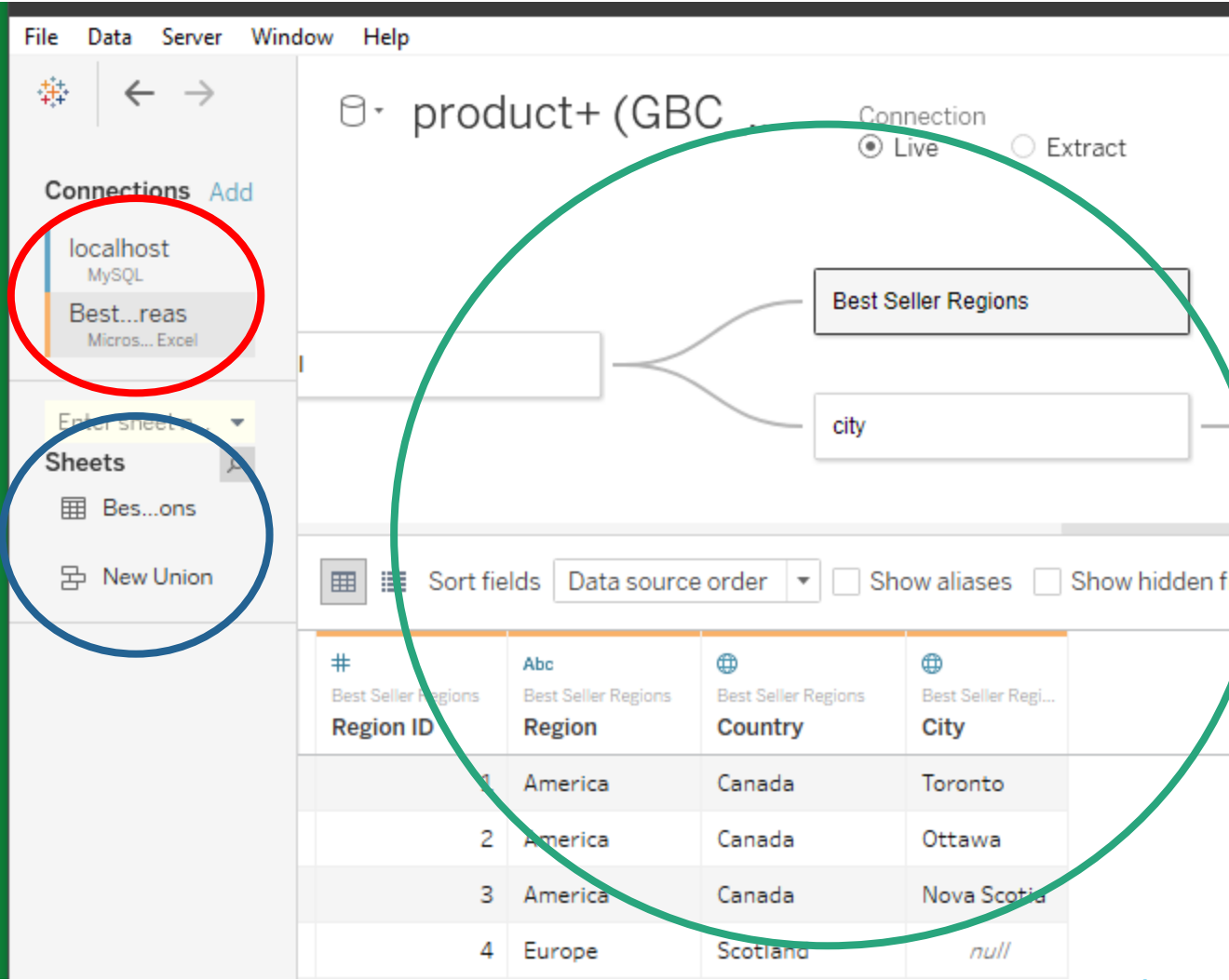
Tables and Joins

– cont’d

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The screenshot shows a database management interface. On the left, under 'Connections', 'localhost MySQL' is highlighted with a red circle (1). Below it, under 'Sheets', 'Best...ons' is highlighted with a blue circle (2). The main area shows a query for 'product+ (GBC' with 'Live' connection selected. A diagram shows a join between 'Best Seller Regions' and 'city'. Below the diagram, a table is displayed with the following data:

#	Best Seller Regions	Best Seller Regions	Best Seller Regions	Best Seller Regi...
Region ID	Region	Country	City	
1	America	Canada	Toronto	
2	America	Canada	Ottawa	
3	America	Canada	Nova Scotia	
4	Europe	Scotland	null	

DATA VISUALIZATION TECHNIQUES

Business Intelligence tools

Tableau / MySQL Integration

TABLEAU – Data Source Selection

1

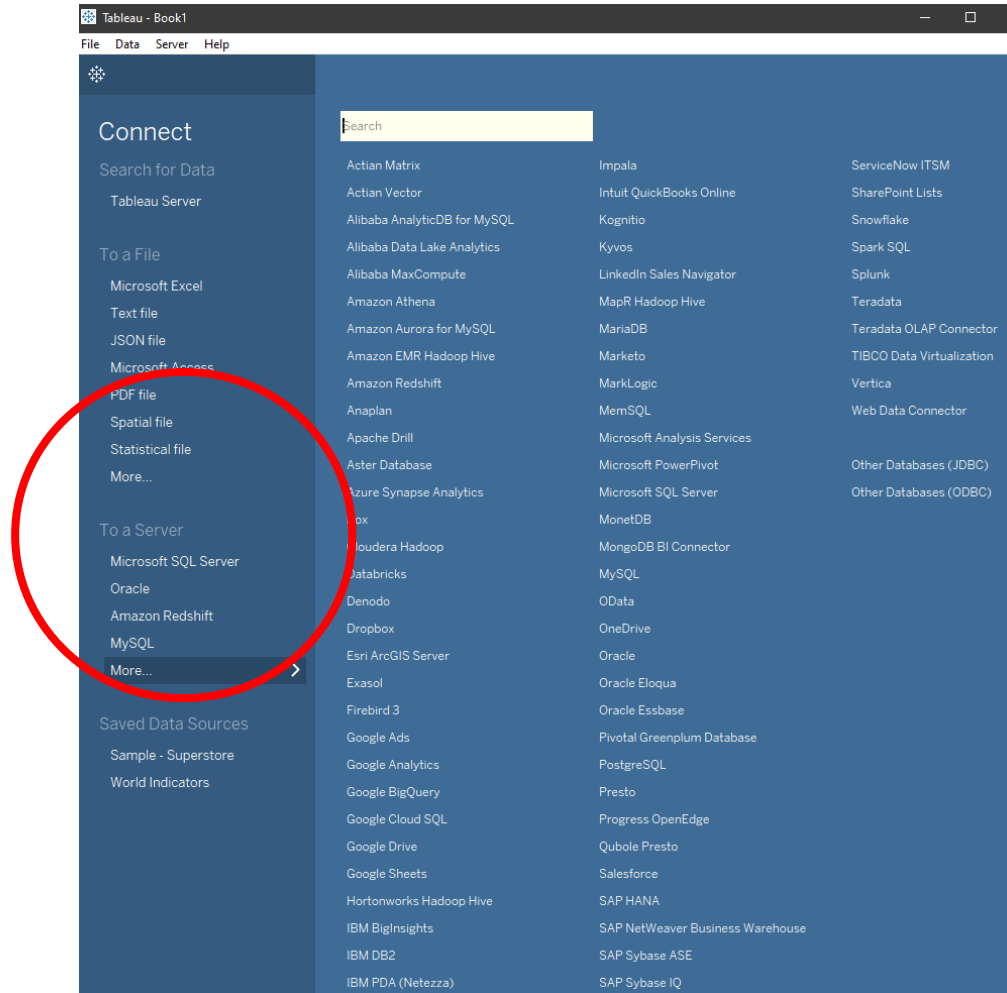
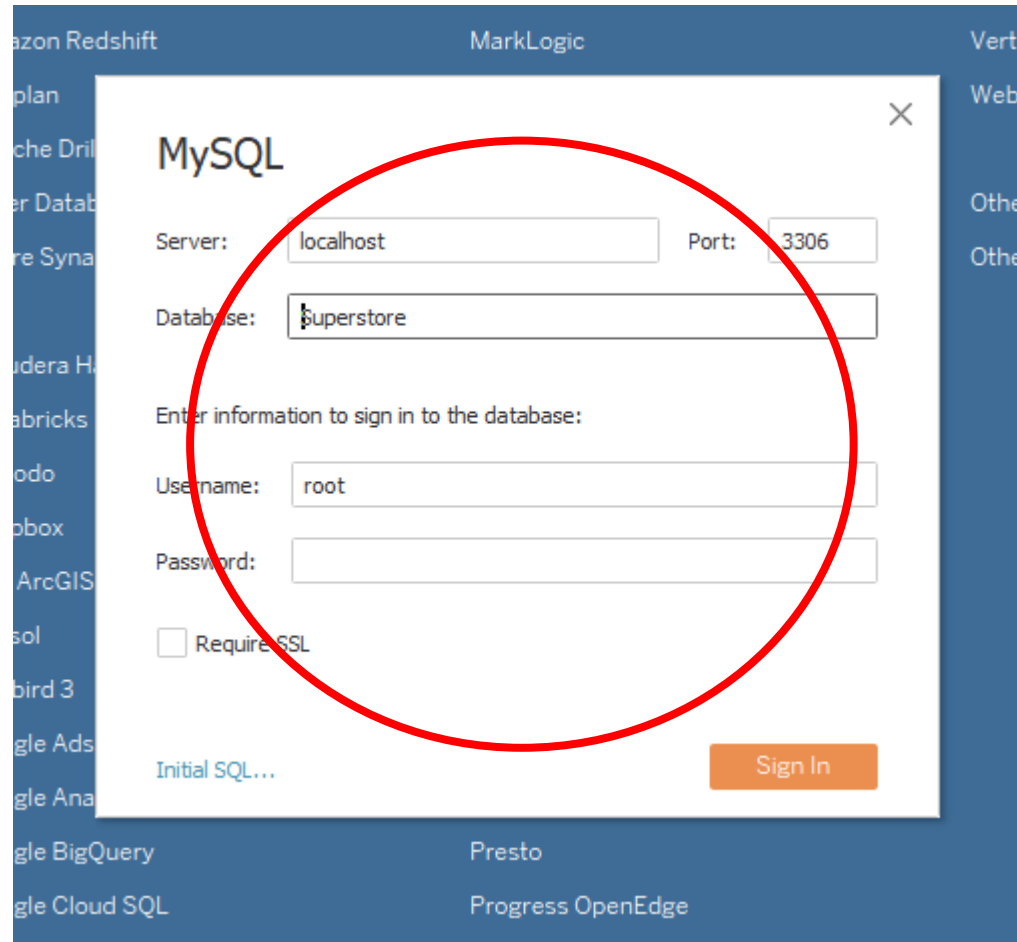


TABLEAU – MySQL Connection

1



The screenshot shows the Tableau interface with a 'MySQL' connection dialog box open. The dialog box has a title bar with 'MySQL' and a close button. It contains the following fields and options:

- Server:** A text box containing 'localhost'.
- Port:** A text box containing '3306'.
- Database:** A text box containing 'superstore'.
- Enter information to sign in to the database:** A section containing:
 - Username:** A text box containing 'root'.
 - Password:** A text box that is currently empty.
- Require SSL:** A checkbox that is currently unchecked.
- Initial SQL...** A link at the bottom left.
- Sign In** An orange button at the bottom right.

A red circle is drawn around the 'Server', 'Port', 'Database', 'Username', and 'Password' fields, indicating the required information for the connection.

